

LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA₁₅ | Greatworth to Lower Boddington

Data appendix (AQ-oo1-o15)

Air quality

November 2013

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1 Introduction

- 1.1.1 The air quality appendix for the Greatworth to Lower Boddington community forum area (CFA15) comprises:
 - discussion of the policy framework (Section 2);
 - baseline air quality data (Section 3);
 - dust impact evaluation and risk rating (Section 4); and
 - air quality assessment road traffic (Section 5).
- 1.1.2 Maps referred to throughout the air quality appendix are contained within the Volume 5, Air Quality Map Book.

2 Policy framework

- 2.1.1 Saved policy G₃ of the South Northamptonshire Local Plan¹ seeks to prevent development that is likely to cause problems of air pollution.
- 2.1.2 The submission version of the West Northamptonshire Joint Core Strategy Policy BNg² requires proposals for new development to demonstrate that they provide opportunities to minimise and where reasonably practicable, reduce pollution, maintaining or improving air quality in accordance with national air quality standards and best practice. Policy C6, relating to the Proposed Scheme, requires the proposal to minimise adverse impacts on the environment and expects the implementation of the Proposed Scheme to manage the construction to minimise the impact on communities and the environment.
- 2.1.3 Local and regional guidance relevant to this assessment includes the Northamptonshire Highway Air Quality Strategy 2013³ which seeks to influence modes of travel in order to improve air quality.

¹ South Northamptonshire District Council (2007) Local Plan Saved Policies 2007.

² West Northamptonshire Joint Planning Unit (2011) West Northamptonshire Joint Core Strategy 2011.

³ Northamptonshire County Council (2013) Northamptonshire Highway Air Quality Strategy 2013.

3 Baseline air quality data

3.1 Existing air quality

Local authority review and assessment information

- 3.1.1 South Northamptonshire Council carries out monitoring across the borough, focusing on locations with traffic congestion and roads with high traffic volume. As part of its review and assessment process the Council has identified three areas that may not be compliant with air quality standards: Towcester, Kislingbury and Roade. In 2008 the Council declared an air quality management area (AQMA) in central Towcester in respect of the annual mean nitrogen dioxide (NO2) standard. Monitoring has continued in Roade and Kislingbury. All three of these areas lie outside the study area.
- Cherwell District Council carries out monitoring across the borough, focusing on locations with traffic congestion and roads with high traffic volume. As part of its review and assessment process the Council has identified that some areas of Banbury may not be compliant with air quality standards. In 2010 the Council declared an AQMA in Banbury along the A422 Hennef Way in respect of the annual mean NO2 standard. Monitoring has been undertaken alongside Hennef Way.

Local air quality monitoring data

- 3.1.3 Monitoring data can be compared with air quality standards, which are as follows:
 - 40µg/m³ as an annual mean for NO2 and PM10;
 - 200µg/m³ one-hour mean for NO2 not to be exceeded more than 18 times a year (equivalent to the 99.8th percentile of the one-hour mean);
 - 50µg/m³ 24-hour mean for PM10 not to be exceeded more than 35 times a year (equivalent to the 90.4th percentile of the 24-hour mean); and
 - 25µg/m³ as an annual mean for PM2.5.
- 3.1.4 Monitoring sites within the study area that are considered relevant for this assessment are shown in Map AQ-01-015 (Volume 5, Air Quality Map Book). The following sections provide a summary of the recorded pollutant concentrations at these sites.

Continuous monitoring

3.1.5 This section summarises the results from the continuous monitoring sites that are considered relevant for the assessment of air quality in this study area.

Table 1: Annual mean pollutant concentrations recorded at continuous monitoring sites^{4,5}

Pollutant	Annual mean concentrations (μg/m³)					
	2008	2009	2010	2011	2012	

⁴ Source: Cherwell District Council (2010) Air Quality Detailed Assessment Hennef Way, Banbury

⁵ Source: http://www.airqualityengland.co.uk/site/exceedence?site_id=BANB (site accessed October 2013)

Annual mean concentrations (μg/m³)							
2008	2009	2010	2011	2012			
Hennef Way ⁶ (446570, 241725)							
74	Not available	Not available	78	90 ⁷			
	2008 70, 241725)	2008 2009 70, 241725)	2008 2009 2010 70, 241725)	2008 2009 2010 2011 70, 241725)			

Table 2: Number of hours when hourly mean NO2 concentrations exceed 200μg/m³ at continuous monitoring sites^{4,5}

Site	Number of exceedances of hourly mean NO2 standard						
	2008	2009	2010	2011	2012		
Hennef Way ⁶	48	Not available	Not available	151	66 ⁷		

Diffusion tubes

3.1.6 This section summarises the results from the diffusion tube sites that are considered relevant for the assessment of air quality in this study area.

Table 3: Annual mean NO2 concentrations recorded at diffusion tube monitoring sites⁸

Site	Ordnance	Annual mean NC)2 concentrations (concentrations (μg/m³)			
	Survey coordinates	2008	2009	2010	2011	2012	
Stroud Close ⁹	446335, 241687	29.6 ¹⁰	Not available	Not available	Not available	Not available	
Hennef Way ⁶	446570, 241725	88	Not available	Not available	Not available	Not available	

Background pollutant concentrations

3.1.7 Estimates of background air quality have been taken from Department for Environment, Food and Rural Affairs (Defra) maps¹¹. Background NO₂ concentrations are within air quality standards throughout the study area with annual mean concentrations in the range 9.7μg/m³ - 29.8μg/m³ in 2012. Background PM10 concentrations are within air quality standards throughout the study area with annual mean concentrations in the range 14.6μg/m³ - 18.2μg/m³ in 2012.

Local emission sources

3.1.8 The main source of pollution in the study area is road vehicles. Major roads include the A361 Byfield Road, A422 Hennef Way, A423 Southam Road and B4525 Welsh Road.

⁶ Data beyond 2008 and 2011 not available from Council air quality review and assessment reports available at www.cherwell.gov.uk or www.airqualityengland.co.uk (sites accessed October 2013)

⁷ Data recorded up to 9 April 2012

⁸ Source: Cherwell District Council (2009) Air Quality Progress Report,.

 $^{^{9}}$ Measured annual mean NO2 in 2007: 2 5.4 μ g/m 3 . Data beyond 2007 not available from Council air quality review and assessment reports available at www.cherwell.qov.uk (site accessed October 2013)

^{10 25%} data capture in 2008

¹¹ Department for Environment, Food and Rural Affairs (Defra) (2012) *Defra Background Pollutant Concentration Maps*; http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html; Accessed: July 2013

3.2 Receptors

Human

Construction phase

3.2.1 Potential receptors are primarily those residential properties close to construction activity and alongside roads where traffic flows will change as a consequence of construction activity. Notable receptors in relation to construction activities include properties at Greatworth Hall, Water End, Manor Cottages, Astral House, Spella Bungalow, Blackgrounds, Culworth Road and Fir Tree House. Notable receptors near roads where traffic flows will increase are Chacombe Lodge Farm, Walnut House, Grimsbury Manor and properties on Banbury Lane, the A361 Byfield Road, A423 Southam Road, Dean Close, Stroud Close, Daventry Road and Fisher Close. Receptors at greatest risk of dust effects are indicated in Maps AQ-02-015-01 and AQ-02-015-02.

Operational phase

Once the Proposed Scheme is operational, only receptors located on roads where increases in operational traffic will occur or where road alignment will change by greater than 5m have the potential to be affected.

Ecological

Construction phase

3.2.3 No ecological receptors in the study area are considered at risk of being affected by air quality as a result of the construction phase.

Operational phase

3.2.4 No ecological receptors in the study area are considered at risk of being affected by air quality as a result of the operational phase.

4 Dust impact evaluation and risk rating

- The following sections provide details of the assessment of construction impacts following the Institute of Air Quality Management (IAQM) guidance¹². Where considered useful to identify receptors and their relationship to the construction activity, a specific figure is provided. On-site haul movements were assessed explicitly.
- The dust assessments criteria for the haul route are based on those for earthworks, as set out in the IAQM guidance. This emission phase was considered to be the most applicable, as the assessment of impacts from the earthworks will depend, in part, on the passage of vehicles over open surfaces. It was assumed that significant effects would not occur beyond a distance of 50m from the haul route, again based on interpretation of the earthworks criteria, and that all areas of the haul route will be subject to more than 10 vehicle movements per day. On the basis of criteria for earthworks within the IAQM guidance, the dust emission class for the haul route is large. Wherever there are receptors within 50m of a haul route, the sensitivity of the receiving environment was derived using the IAQM guidance. The need for, and capability of, the local environmental management plan (LEMP) to control these dust emissions, as directed by the draft Code of Construction Practice¹³ (CoCP), was then considered in forming the conclusion of the assessment.

Table 4: Evaluation and risk rating of construction activities

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP	Principal justifications
					mitigation measures)	
Cuttings and embankmen	ts - Greatworth Hall, Black	grounds, Culworth Road, Fir	Tree House and Spella Orc	hard (Map AQ-02-015-01, Fi	gure 15.1 and Figure 15.4, M	lap AQ-02-015-02, Figure
15.5, 15.6 and 15.7 (Volum	ne 5, Air Quality Map Book))	1				
Demolition	Less than 20m	Small	Medium	Medium	Negligible	1. Total building volume less than 20,000m³. 2. Fewer than 10 receptors within 20m of the site.
Earthworks	20-50m	Large	High	Low	Negligible	Total site area greater than 10,000m² No receptors within

¹² Institute of Air Quality Management (IAQM), (2011), Guidance on the assessment of the impacts of construction on air quality and the determination of their significance

¹³ Volume 5: Appendix CT-003-000

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
						20m of the site.
Construction	20-50m	Medium	Medium	Low	Negligible	 Use of dusty construction materials. No receptors within 20m
Trackout	Less than 20m	Large	High	Medium	Negligible	 More than 100 heavy goods vehicles (HGVs) on road. Receptors within 20m of roadside.
Haul route	Less than 50m	Large	High	Low	Negligible	1. More than 10 HGV movements per day. 2. Fewer than 10 receptors within 50m of haul route.
Green tunnels - Astral Ho	use (Map AQ-02-015-01, Fig	ure 15.2 (Volume 5, Air Qua	lity Map Book))			
Demolition	100-200M	Small	Low	Low	Negligible	1. Total building volume less than 20,000m ³ . 2. Fewer than 10 receptors within 20m of the site.
Earthworks	50-100m	Large	Medium	Low	Negligible	 Total site area greater than 10,000m². No receptors within 20m of the site.
Construction	100-200M	Medium	Low	Low	Negligible	 Use of dusty construction materials. No receptors within 20m.

Activity	Distance to nearest receptor	Dust emission class	Dust risk category	Sensitivity of surrounding area	Magnitude of impact (with draft CoCP mitigation measures)	Principal justifications
Trackout	Less than 20m	Large	High	Medium	Negligible	 More than 100 HGVs on road. Receptors within 20m of roadside.
Haul route	Less than 50m	Large	High	Low	Negligible	1. More than 10 HGV movements per day. 2. Fewer than 10 receptors within 50m of haul route.
Aqueducts and viaducts - \	Water End and Manor Cotta	ages (Map AQ-02-015-01, Fi	gure 15.3 (Volume 5, Air Qu	ality Map Book))		
Demolition	20-100m	Small	Low	Low	Negligible	 Total building volume less than 20,000m³. No receptors within 20m of the site.
Earthworks	50-100m	Medium	Medium	Low	Negligible	 Total site area 2,500m² 10,000m² No receptors within 20m of the site.
Construction	50-100m	Medium	Medium	Low	Negligible	 Use of dusty construction materials. No receptors within 20m of the site.
Trackout	Less than 20m	Large	High	Medium	Negligible	 More than 100 HGVs on road. Receptors within 20m of roadside.
Haul route	N/A	N/A	N/A	N/A	N/A	1. No receptors within 50m of the haul route.

Table 5: Summary of construction dust impacts and effects

Location	Magnitude of impact	Effect of dust-generating	Additional mitigation
		activities	
Cuttings and embankments	Negligible	Not significant	None required
Green tunnels	Negligible	Not significant	None required
Aqueducts and viaducts	Negligible	Not significant	None required

5 Air quality assessment - road traffic

5.1 Overall assessment approach

- The air quality assessment for road-related emissions has considered the use of three different approaches based on the scale of changes in traffic and road alignment. Where the Design Manual for Roads and Bridges¹⁴ (DMRB) thresholds detailed in the Scoping and Methodology Report (SMR) (Volume 5: Appendix CT-001-000/1) are not exceeded, no additional assessment is required as the air quality impacts will be minimal. If these thresholds will be breached, then a quantitative assessment has been carried out.
- Where the road configuration is straightforward, the DMRB screening method has been used to predict changes in air quality. Where the road layout is considered to be complex or where the use of the DMRB screening method indicated that there will be a potential exceedance of air quality standards, the atmospheric dispersion model ADMS-Roads has been used for the assessment. Professional judgment has been used to select the appropriate tool for each area.
- 5.1.3 In this study area both the DMRB screening method and the ADMS-Roads model have been used for the assessment.

5.2 Model inputs and verification

Model parameters for detailed assessment

ADMS-Roads was used for the detailed assessment. A surface roughness length of o.5m, meteorological site surface roughness length of o.2m, minimum Monin Obukhov length of 30m and latitude of 52 degrees were used in the detailed assessment. All other parameters were model default settings. Meteorological data from the London Heathrow monitoring site were used.

Model verification

The traffic data provided for Aylesbury did not adequately cover roads close to monitoring locations that would allow meaningful verification to be undertaken. Therefore the model was not verified.

5.3 Construction traffic model

5.3.1 Roads assessed for construction traffic are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were based on maximum traffic on affected roads during the construction phase of the Proposed Scheme.

Receptors assessed

5.3.2 For all road links where DMRB criteria for assessment of local air quality impacts were met, a number of receptors representative of worst-case exposure locations were selected for assessment. These included locations representative of highest pollutant

¹⁴ Highways Agency, (2007), The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 1 Air Quality HA207/07)

concentrations along the roads, including closest to junctions or to the road itself. Receptors assessed are presented in Map AQ-01-015 (Volume 5, Air Quality Map Book).

Table 6: Modelled receptors (construction phase)

Receptor	Description/location	Ordnance Survey coordinates
15-1	Chacombe Lodge Farm (B4525 Banbury Lane (south west of Banbury Road))	451839, 243996
15-2	Walnut House (Banbury Road (south west of Thorpe Mandeville))	452968, 244585
15-3	Property on Banbury Lane (Banbury Lane)	453526, 245496
15-4	Property on A ₃ 61 Byfield Road (A ₃ 61 Byfield Road (south of Welsh Road))	449955, 249009
15-5	Property at Eden Hall, A423 Southam Road	445555, 243878
15-6	Hardwick Cottages, off A423 Southam Road	445594, 242457
15-7	Property on Dean Close, Banbury (near A422 Hennef Way)	446074, 241584
15-8	Property on Stroud Close, Banbury (near A422 Hennef Way)	446335, 241688
15-9	Property on Daventry Road, Banbury (near A422 Hennef Way)	446760, 241633
15-10	Grimsbury Manor, Grimsbury Green, Banbury (near A422 Hennef Way)	446248, 241707
15-11	Property on Fisher Close, Banbury (near A422 Hennef Way)	446554, 241722
15-12	Property on Fisher Close, Banbury (near A422 Hennef Way)	446574, 241724

Background concentrations

5.3.3 The background concentrations used in the assessment are shown in Table 7 taken from the Defra maps. For the ADMS-Roads dispersion modelling the use of background data from Defra maps and urban background sites was considered, but this approach was considered to underestimate baseline conditions to an extent that might unreasonably influence conclusions on the significance of air quality effects. The 2012 baseline was, therefore, derived from the average of concentrations monitored at three roadside sites on the A422, from which the contribution from the 2012 base traffic on the A422 was subtracted to derive the 2012 baseline background concentration for the locality. For 2017, the 2012 derived baseline was adjusted by a factor of 0.83, the same factor for the area as in the Defra background maps between 2012 and 2017. This approach was used in the study to reflect more accurately the existing concentrations that are present in the AQMA along Hennef Way. This approach for background concentrations was considered to be the most representative.

Table 7: Background 2017 concentrations at assessed receptors

Receptor (or zone of	Concentrations (μg/m³)				
receptors)	NOx	NO ₂	PM10 _o		
15-1 Chacombe Lodge Farm	12.3	9.1	15.5		

Appendix AQ-001-015

Receptor (or zone of	Concentrations (μg/m³)					
receptors)	NOx	NO ₂	PM10 ₀			
15-2 Walnut House	11.6	8.6	15.0			
15-3 Property on Banbury Lane	11.0	8.2	13.8			
15-4 Property on A361 Byfield Road	11.1	7.8	14.9			
15-5 Property at Eden Hall, A423	24.7	17.0	17.8			
15-6 Hardwick Cottages	51.7	29.8	18.2			
15-7 Property on Dean Close	42.9	26.2	17.1			
15-8 Property on Stroud Close	42.9	26.2	17.1			
15-9 Property on Daventry Road	42.9	26.2	17.1			
15-10 Grimsbury Manor	42.9	26.2	17.1			
15-11 Property on Fisher Close	42.9	26.2	17.1			
15-12 Property on Fisher Close	42.9	26.2	17.1			

Design Manual for Roads and Bridges model results

This section provides the summary of the modelled pollutant concentrations for the assessed receptors using the DMRB methodology. The magnitude of change and impact descriptor for receptors identified are derived following the Environmental Protection UK (EPUK) methodology¹⁵.

Table 8: Summary of DMRB annual mean NO2 results (construction phase)

Receptor	Concentrations (µg/	Concentrations (μg/m³)			Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme	concentrations (µg/m³)		
15-1	13.5	12.1	15.5	3.4	Medium increase	Negligible
15-2	10.9	9.3	11.9	2.6	Medium increase	Negligible
15-3	10.0	8.4	11.9	3.5	Medium increase	Negligible
15-4	12.2	10.4	15.6	5.1	Large increase	Slight adverse
15-5	25.5	22.5	23.5	1.0	Small increase	Negligible
15-6	35.8	31.9	32.1	0.2	Imperceptible increase	Negligible
15-7	30.7	26.6	26.7	<0.1	Imperceptible increase	Negligible
15-8	40.7	35.7	36.0	0.3	Imperceptible increase	Negligible
15-9	37-5	32.8	33.0	0.2	Imperceptible increase	Negligible

¹⁵ Environmental Protection UK (EPUK), (2010), Development Control: Planning for Air Quality

Appendix AQ-001-015

Table 9: Summary of DMRB annual mean PM10 results (construction phase)

Receptor	Concentrations (μg/m³)			Change in	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed Scheme	2017 with Proposed Scheme	concentrations (µg/m³)		
15-1	16.8	16.2	16.4	0.3	Imperceptible increase	Negligible
15-2	15.8	15.1	15.3	0.2	Imperceptible increase	Negligible
15-3	14.6	13.9	14.2	0.3	Imperceptible increase	Negligible
15-4	16.3	15.5	16.0	0.5	Small increase	Negligible
15-5	19.8	18.8	18.9	0.1	Imperceptible increase	Negligible
15-6	19.9	18.6	18.7	0.02	Imperceptible increase	Negligible
15-7	18.3	17.2	17.2	<0.1	Imperceptible increase	Negligible
15-8	20.2	18.8	18.9	<0.1	Imperceptible increase	Negligible
15-9	19.5	18.3	18.3	<0.1	Imperceptible increase	Negligible

Detailed modelling results

5.3.5 This section provides the summary of the modelled pollutant concentrations for the assessed receptors using ADMS-Roads. The magnitude of change and impact descriptor for human receptors are derived following the EPUK methodology¹⁵.

Table 10: Summary of ADMS-Roads annual mean NO2 results (construction phase)

Receptor	ceptor NO2 concentrations (µg/m³)			Change in	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed	2017 with Proposed	concentrations (μg/m³)		
		Scheme	Scheme			
15-9	17.1	13.3	13.6	0.3	Imperceptible increase	Negligible
15-10	24.3	17.8	18.2	0.4	Imperceptible increase	Negligible

Receptor	NO ₂ concentrations (μg/m³)			Change in	Magnitude of change	Impact descriptor
	2012 baseline	2017 without Proposed	2017 with Proposed	concentrations (μg/m³)		
		Scheme	Scheme			
15-11	77.1	58.5	59.0	0.5	Small increase	Slight adverse
15-12	76.5	59.1	59.6	0.5	Small increase	Slight adverse

Assessment of significance

- The overall magnitude of impact of the Proposed Scheme is slight adverse at worst for NO2 and negligible for PM10 during construction. Pollutant concentrations will remain well within air quality standards with and without the Proposed Scheme at most locations. At receptors in the Hennef Way AQMA, concentrations are predicted to be in excess of air quality standards, both with and without the Proposed Scheme. The impacts arising from NO2 in this area are slight adverse at worst.
- 5.3.7 The changes in air quality at worst-case receptors during the construction phase will not cause significant effects since the adverse impact is negligible or slight, taking into account background air quality and air quality standards.

5.4 Operational traffic model

Operational traffic scenarios on which this assessment is based are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were based on maximum traffic on affected roads during the operational phase of the Proposed Scheme.

Receptors assessed

No roads were identified that met the criteria for assessment outlined in the SMR. Therefore, no receptors were assessed.

Assessment of significance

There will be no changes to air quality during the operational phase that are more than negligible and therefore there will be no significant effect on receptors.

6 References

Cherwell District Council (2009) Air Quality Progress Report

Cherwell District Council (2010) Air Quality Detailed Assessment Hennef Way, Banbury

Department for Environment, Food and Rural Affairs (Defra) (2012) *Defra Background Pollutant Concentration Maps*; http://laqm.defra.gov.uk/maps/maps2010.html; accessed: July 2013.

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